REMARKS

As a preliminary matter, Applicants wish to thank the Examiner for his detailed drawing review, and for his recommended corrections to the drawings and specification. Reconsideration and allowance of the above-identified application is respectfully requested.

Specification

The amendments to the specification on pages 2, 5, 8 and 9 are made to add drawing reference numerals to appropriate paragraphs in accordance with the Examiner's recommendations for overcoming objections to the drawings. Other amendments on pages 9 and 12 are made to correct typographical errors. The amendments on page 16 are made so that the discussion conforms to the newly amended consecutively numbered process steps in Figure 17. The amendments to the title, abstract and elsewhere correct the terminology used to reference the disclosed encoder to more accurately comport with the ordinary understanding of practitioners in coding art. Accordingly, none of these amendments adds any new subject matter to the original specification.

Drawings

The drawings have been amended in accordance with the Examiner's recommendations for overcoming various drawing objections. In addition, throughout the drawings, arrows have been deleted from reference numeral indicators to more easily distinguish the indicators from arrows that denote signal paths.

In Figure 5, the original drawing contained an obvious drafting error showing a connector from 39a to 63. In the amended Figure 5, the error has been corrected by replacing the connector with a new connector from 39b to 63, as described in the spec on page 8, lines 30-31.

In Figure 6, the original drawing contained an obvious drafting error, mislabeling inputs 52 as "m inputs." In the amended Figure 6, the error has been corrected by replacing the label with a new label "D components," as described in the spec on page 9, lines 18-24.

In Figure 11A, the original drawing contained obvious drafting errors showing misplaced brackets 55 and 60. Bracket 55 is too long, because it should not include feedback input 62 to adder 58. Bracket 60 is too short, because it does not include the top-most input of inputs 57. In

the amended Figure 11A, these errors have been corrected by reducing the length of bracket 55 so that it does not include feedback input 62, and by increasing the length of bracket 60 so that it also includes the top-most input of inputs 57. These changes are in accordance with the spec as described on page 6, lines 4-15.

Accordingly, none of the above drawing amendments add any new subject matter to the original specification.

Claims

Claims 1-51 are currently pending in the application. This response amends claims 1, 20-22, 31, 38-39, 41-43 and 47; and cancels claim 3 without prejudice or disclaimer.

A. Claim Objections

Claim 3 has been canceled and claims 20-22, 31, 38-39, 41-43 and 47 have been amended in response to the Examiner's objections. Applicant believes that the amended claims overcome the objections.

B. Rejection Under 35 USC § 112

In response to the rejection under Section 112, claim 1 has been amended. Applicant believes that claim 1 is sufficiently definite to satisfy the statute.

C. Rejection Under 35 USC § 103

Claims 1-8 and 11-19 stand rejected under Section 103 as being obvious in view of Benedetto alone, while claims 9-10, 20-42 and 48-51 stand rejected under Section 103 as being obvious over the combination of Benedetto and U.S. Pat. No. 6,023,783 (Divsalar). Applicant respectfully traverses these rejections for at least the following reasons.

References are not properly combinable or modifiable if their intended function or purpose is destroyed. See, e.g., *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984). It is well established in law that if a cited prior art reference requires some modification in order to meet the claimed invention under Section 103 and such modification destroys the purpose, intent or function of the system disclosed in the reference, one of ordinary skill in the art would not have found a reason

to make the proposed modification, and a prima facie case of obviousness cannot be properly made. *Id.*

Each of the 103 rejections is based on the Examiner's proposed modification to Benedetto, which involves eliminating (puncturing) Benedetto's encoder output x0 (Fig. 4, p. 300) to arrive at the rate n/n encoder of Applicant's claim 1. A rate n/n encoder is, in itself, distinct and nonobvious over Benedetto's encoders, where the rate is always less than one (so that coding gain may be achieved). Modifying Benedetto in the manner proposed by the Examiner is not only absent from the teachings of the cited references, but would plainly destroy the intended functions of Benedetto's encoders.

By the argument of subsets, there always exists a lower rate encoder that can be used to generate any given higher rate encoder, by simply eliminating (puncturing) one or more encoder outputs. But Benedetto's design is for a TCM code. By name and construction, a TCM (trellis coded modulation) code is matched with a particular modulation format, e.g., 16-QAM, and optimizes the BER performance for the code by maximizing Euclidean distances between output codewords when the codewords are mapped to modulation symbols. A TCM code of rate n/n+1 cannot be transformed into a rate n/n code because doing so destroys the modulation mapping associated with the rate n/n+1 code. This is because the n+1 bits of the TCM must be mapped to a modulation that accommodates some integer multiple of n+1 bits. Dropping the encoder output from n+1 to n, as suggested by the Examiner would destroy this modulation mapping, which is an essential function of Benedetto's encoder. Thus, one of ordinary skill in the art would have no reason to, and would in fact be discouraged from making the Examiner's proposed modification.

Furthermore, one of ordinary skill in the art would not modify the teachings of Benedetto as proposed because the Euclidean distance properties of Benedetto's TCM codes are destroyed when they are punctured to rate 1 and mapped to constellations. As stated above, Benedetto's TCM codes are designed to maximize Euclidean distance. Puncturing Benedetto's encoders to rate 1 destroys this optimization, which is an intended function of Benedetto's encoder. In addition, TCM codes are nonlinear (since they attempt to maximize Euclidean distance), and because of their nonlinearity, they are custom-designed, either by hand or by exhaustive searches. Puncturing Benedetto's n+1 encoder output would, at a minimum, require a costly redesign of

the TCM code in any attempt to regain lost Euclidean distance. This would further discourage one of ordinary skill from pursuing the Examiner's proposed modification.

Although simple on its face, the proposed modification of Benedetto leaves a number of issues unresolved in deriving a rate n/n code. Issues such as which base code does one use? which of the base code outputs should be punctured? and how should the encoder's output bits be mapped to a constellation? Benedetto's codes and constructions do not answer any of these questions, and thus, one of ordinary skill would not choose them as a basis from which rate n/n codes would have been generated.

For at least the foregoing reasons, the reference of Benedetto, either alone or in combination, cannot be properly relied upon in making out an obviousness rejection under Section 103. Thus, claims 1-42 and 48-51 are patentable over Benedetto and Divsalar under Section 103.

Conclusion

In view of all of the above, it is respectfully submitted that all claims are allowable. The Examiner is therefore requested to allow all claims and pass this application to issuance.

Applicant believes no fees are due for filing this Response. If any additional fees associated with this Response are in fact due, the Commissioner is hereby authorized to charge Howrey Deposit Account No. 08-3038 for the same referencing Howrey Dkt. No. 01827.0037.00US00.

Respectfully submitted,

Dated: May 17, 2004

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OIPE JC161
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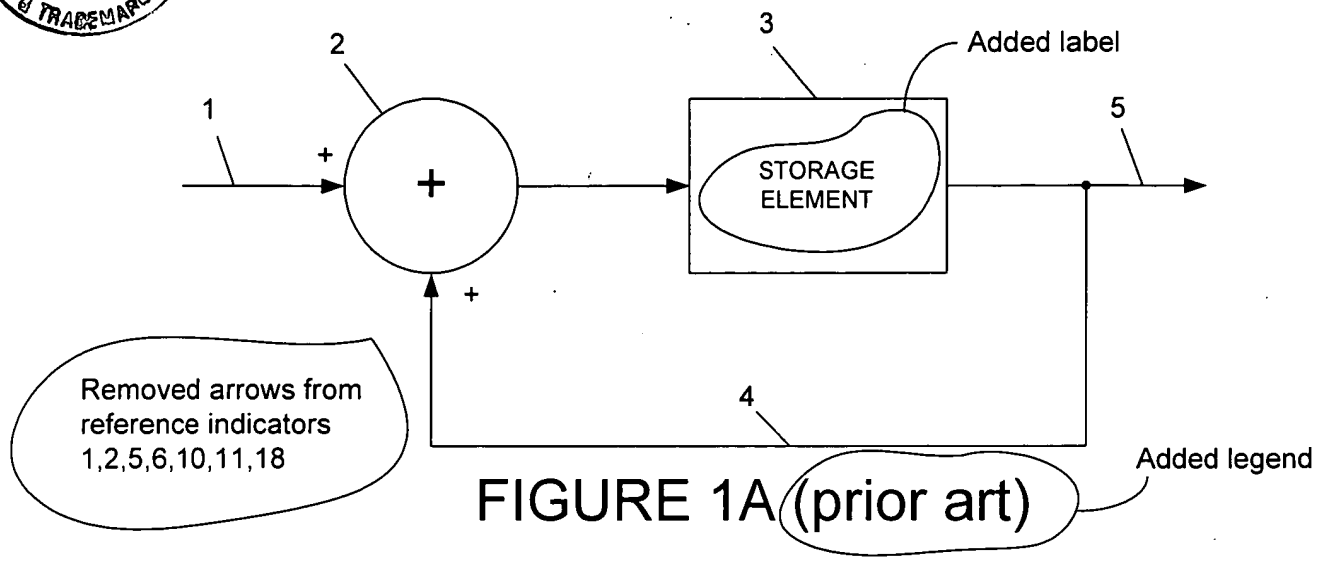

FIGURE 1A (prior art)

Added legend

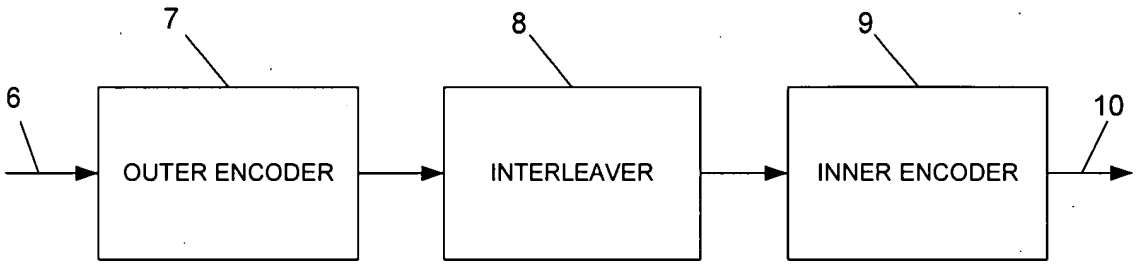

FIGURE 1B (prior art)

Added legend

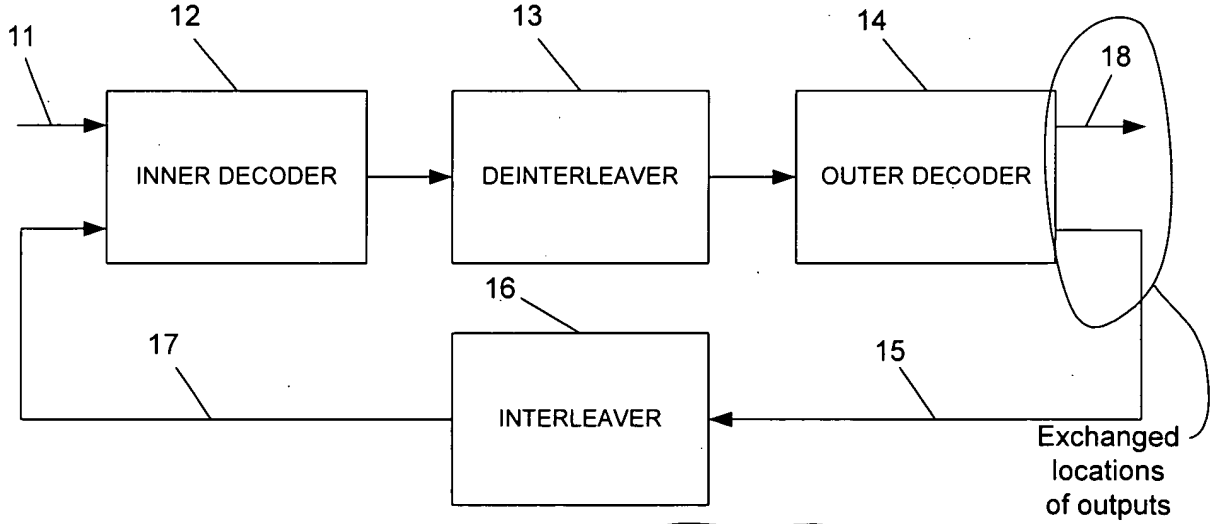

FIGURE 1C (prior art)

Added legend

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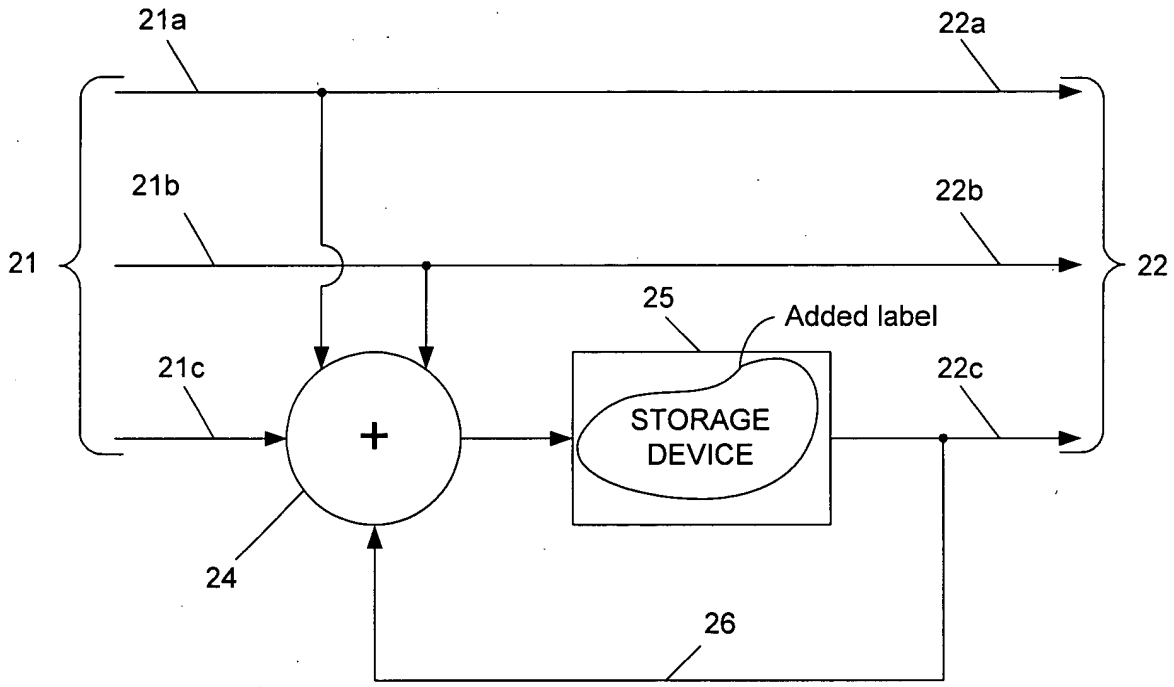
Removed reference numerals and indicators "23a" and "23b"



Removed arrows from reference indicators 21a, 21b, 21c, 22a, 22b, 22c, 24

FIGURE 3A

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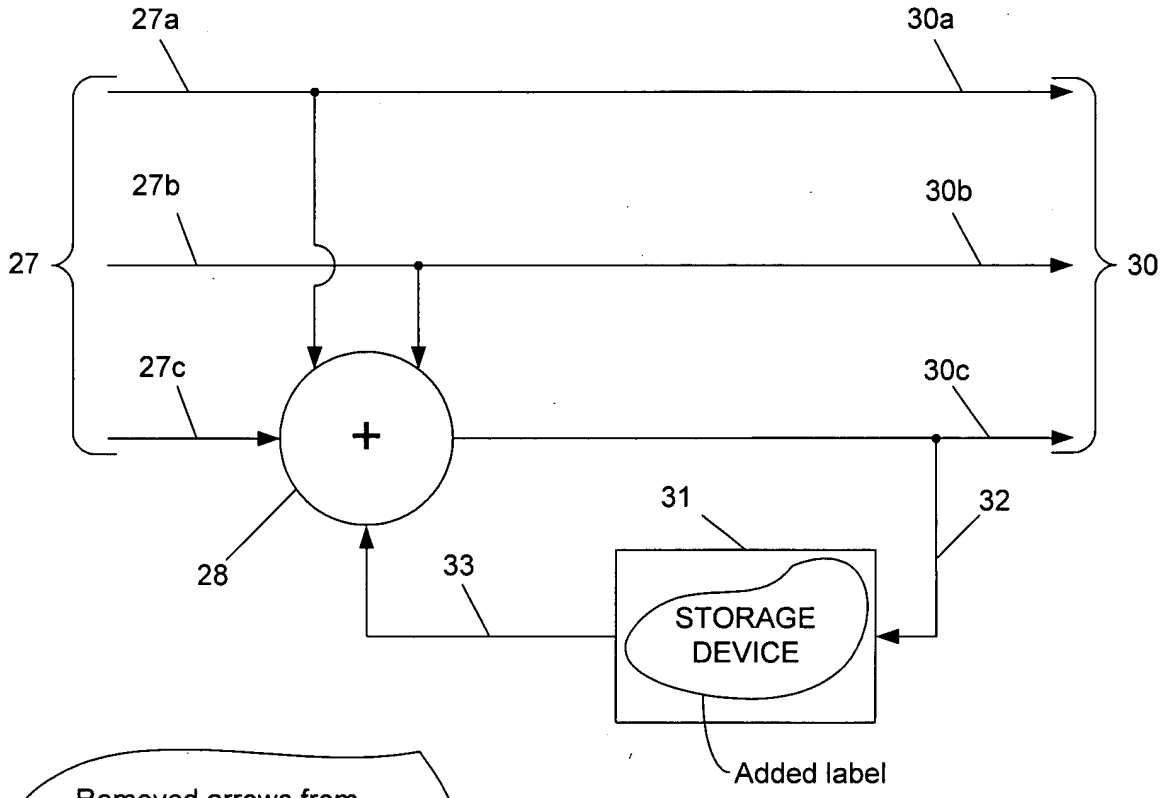
Removed reference numerals and indicators "29a" and "29b"



Removed arrows from reference indicators 27a, 27b, 27c, 28, 30a, 30b, 30c, 32, 33

FIGURE 3B

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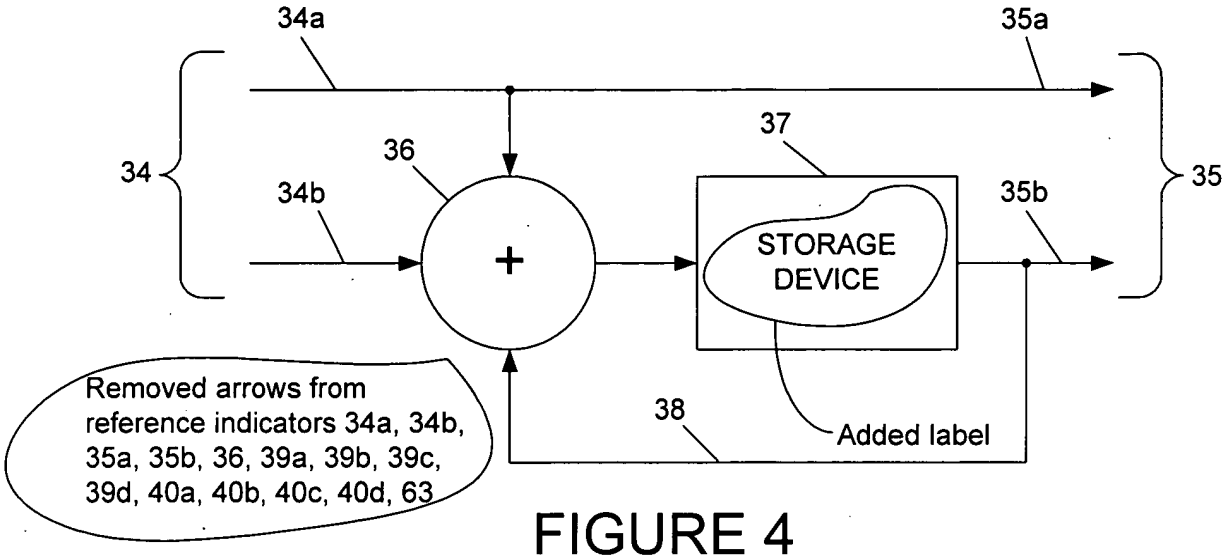

FIGURE 4

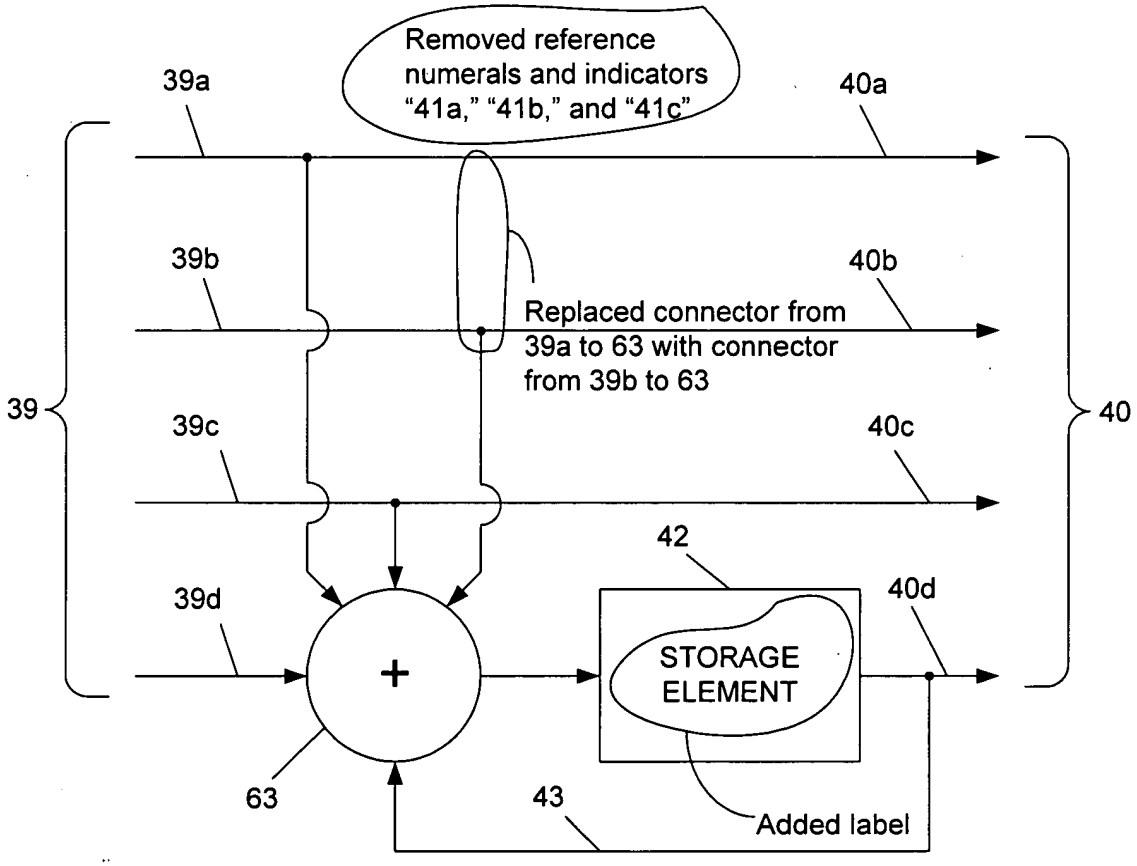

FIGURE 5

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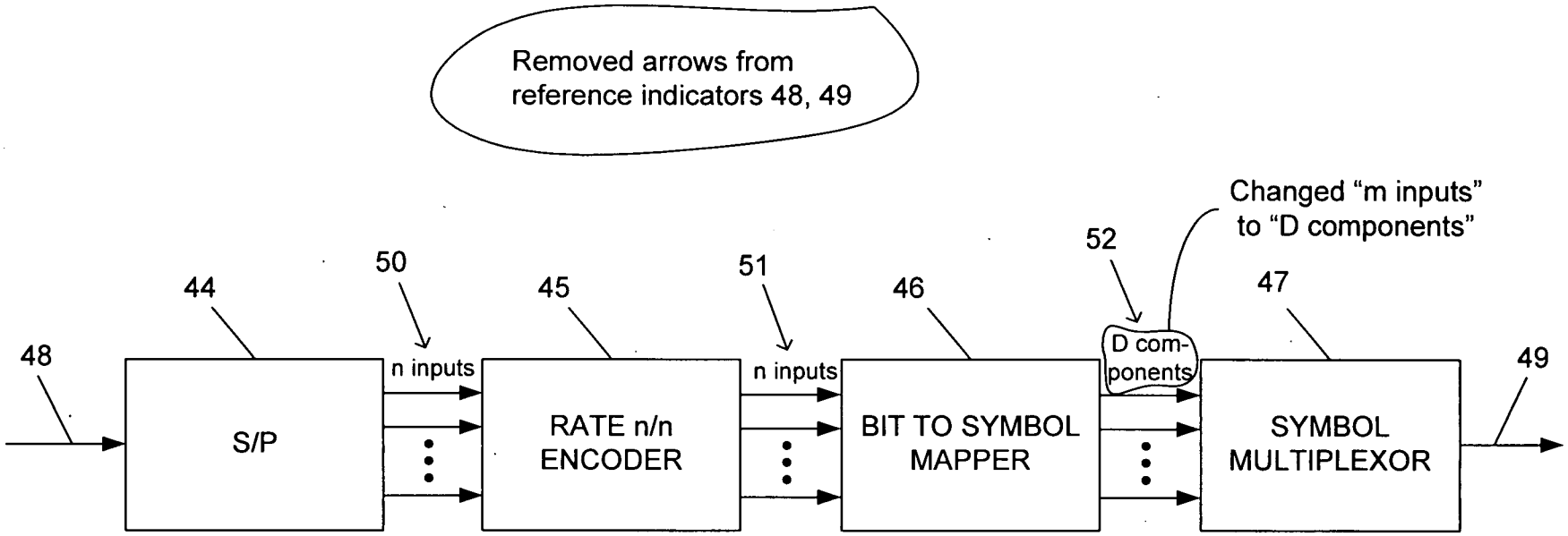

FIGURE 6

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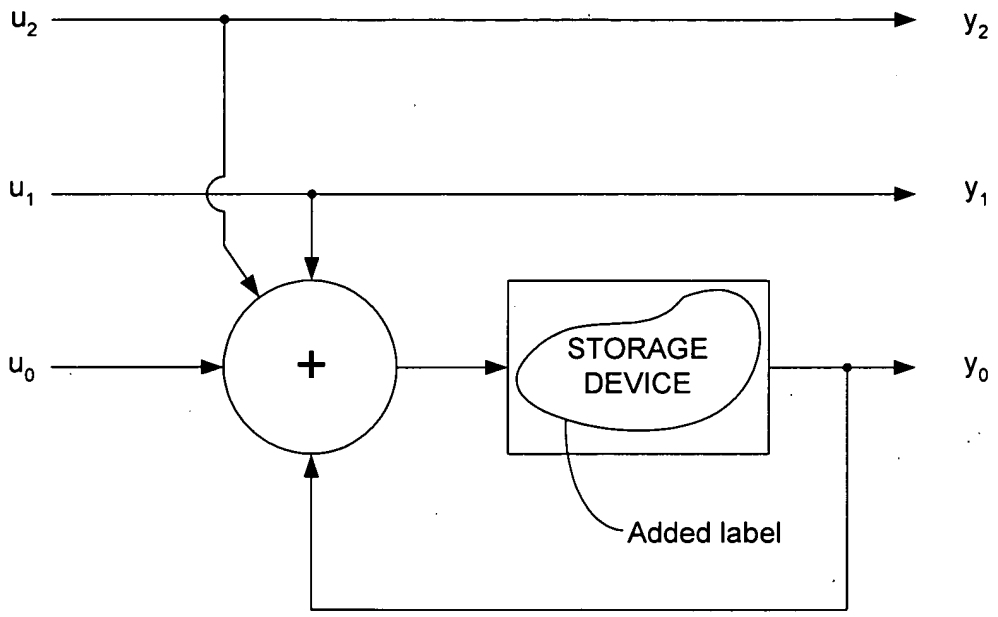

FIGURE 7A

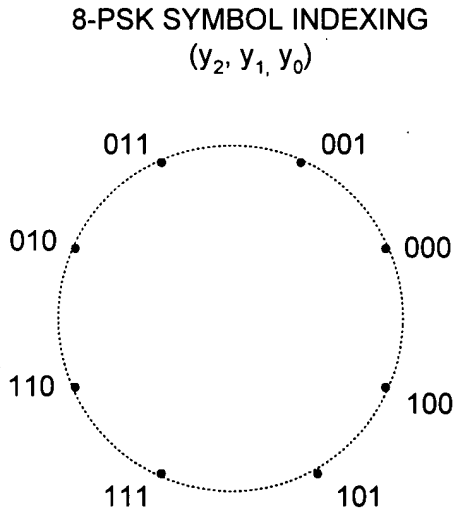

FIGURE 7B

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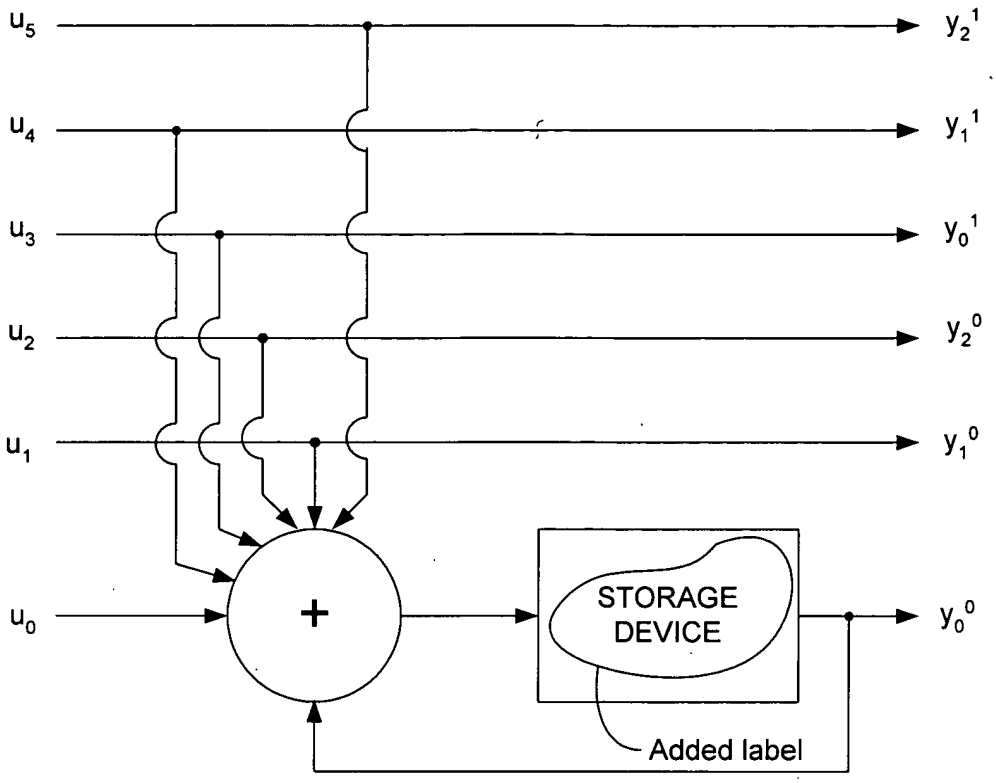

FIGURE 8A

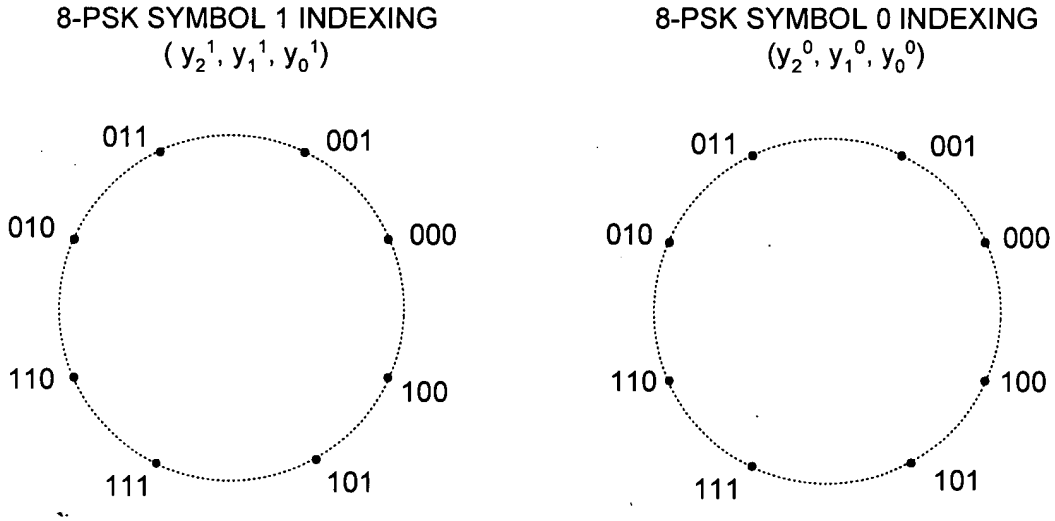

FIGURE 8B

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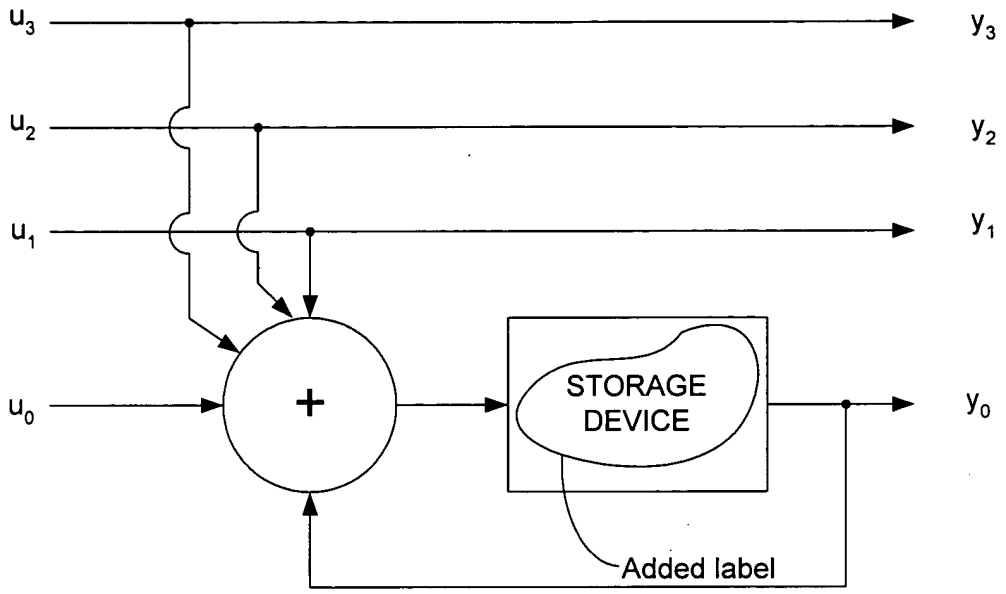

FIGURE 9A

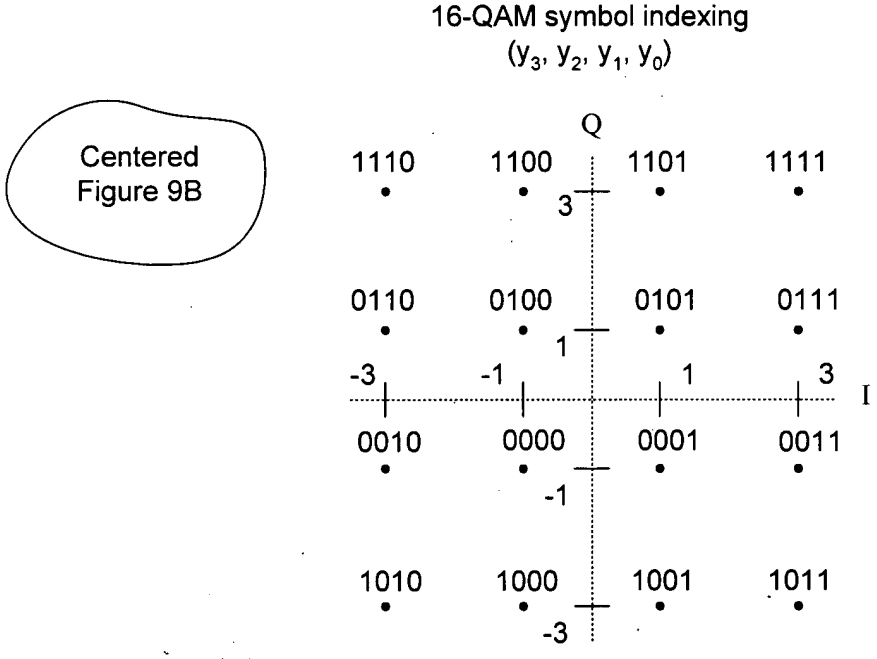

FIGURE 9B

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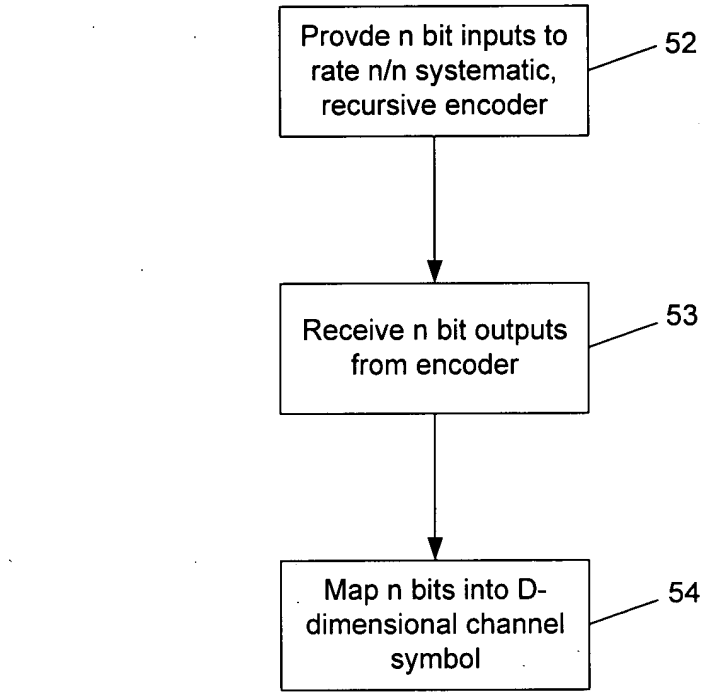

FIGURE 10

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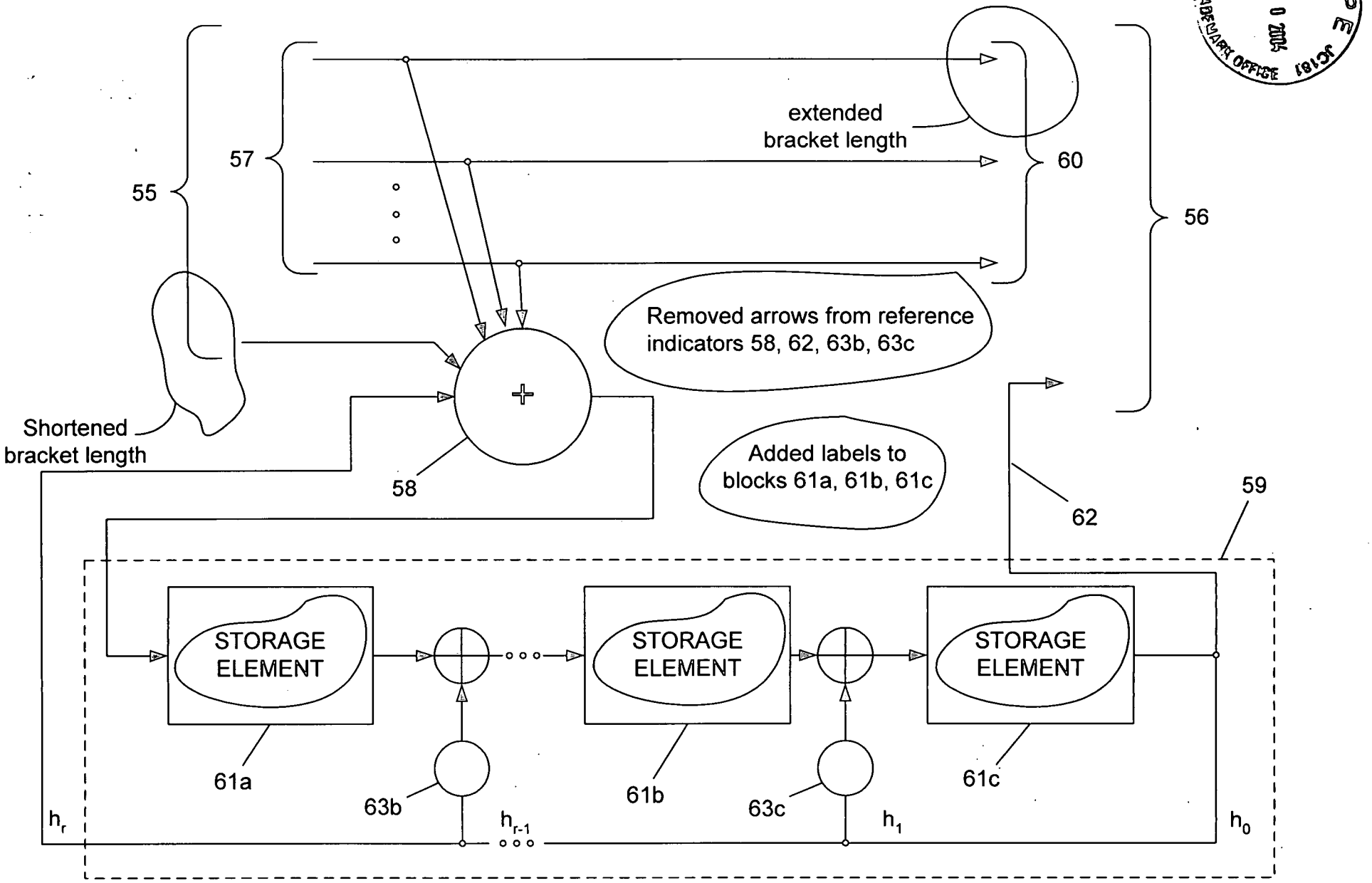

FIGURE 11A

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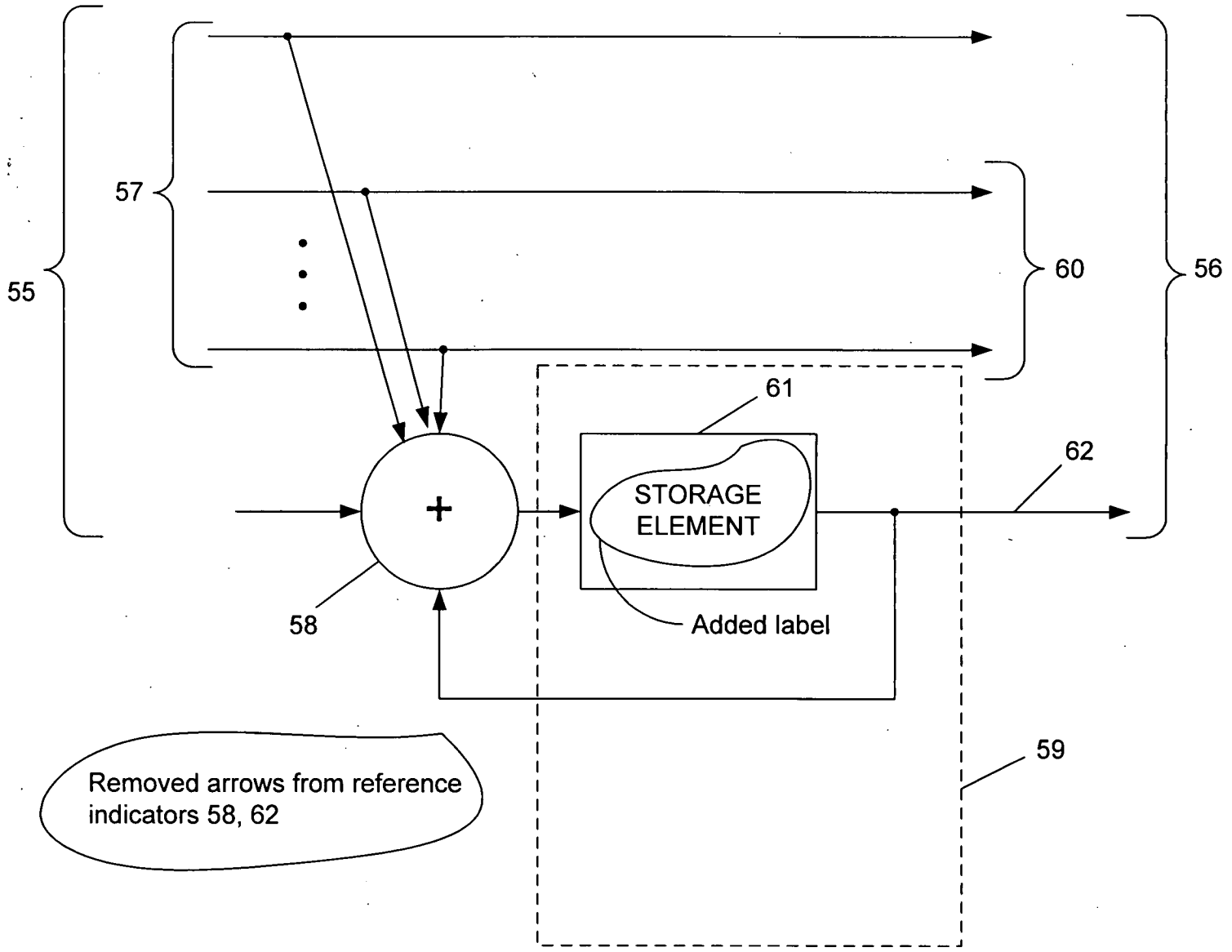

FIGURE 11B

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Deleted reference numeral and indicator "200"

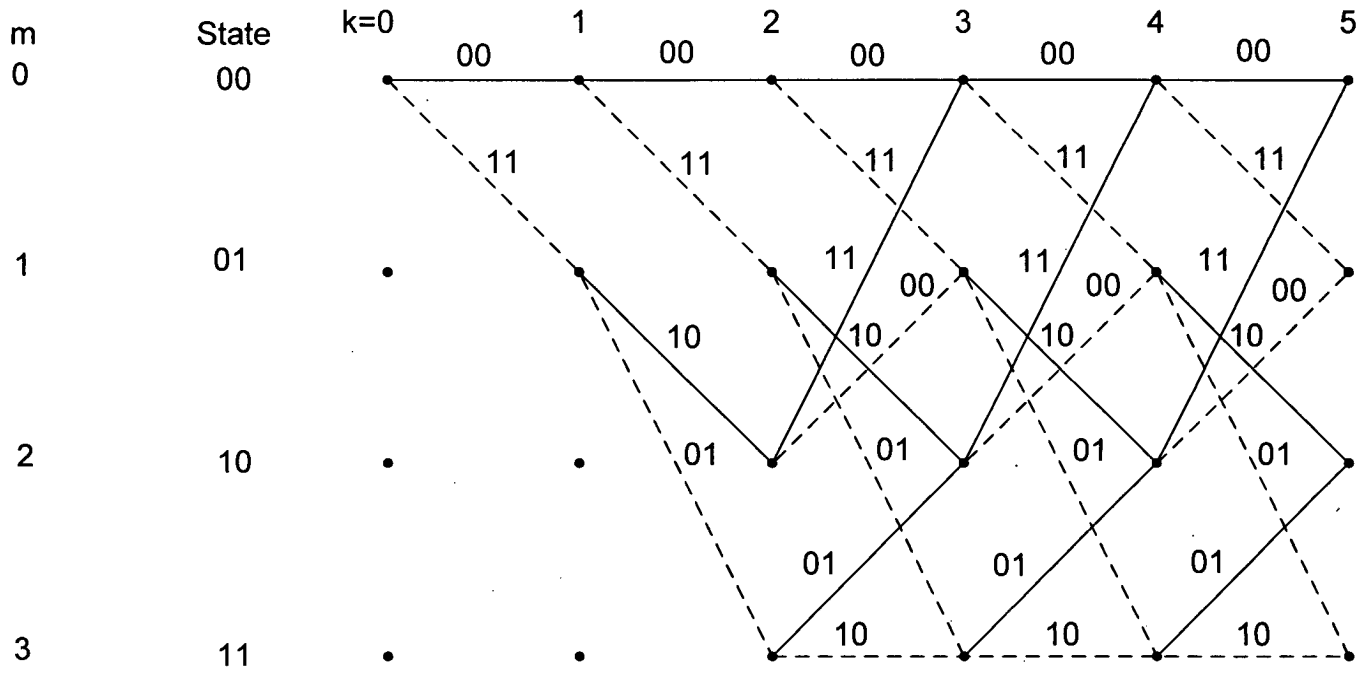

FIGURE 15

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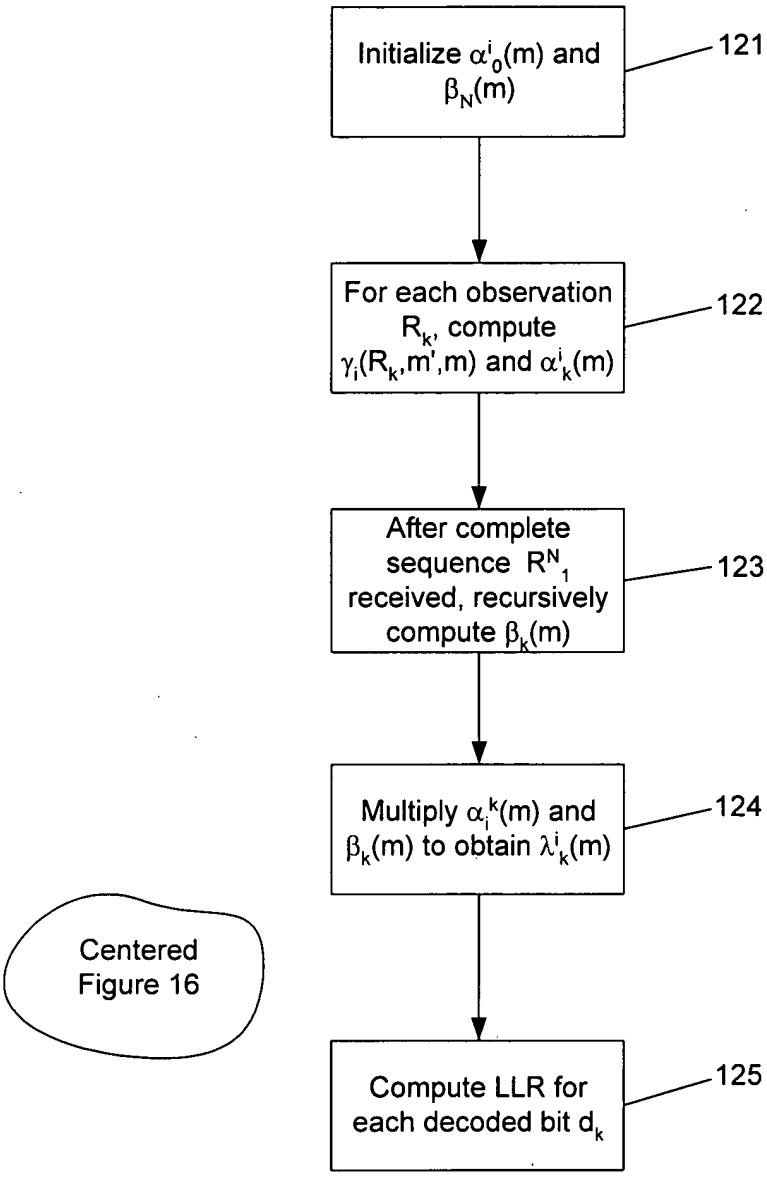

FIGURE 16

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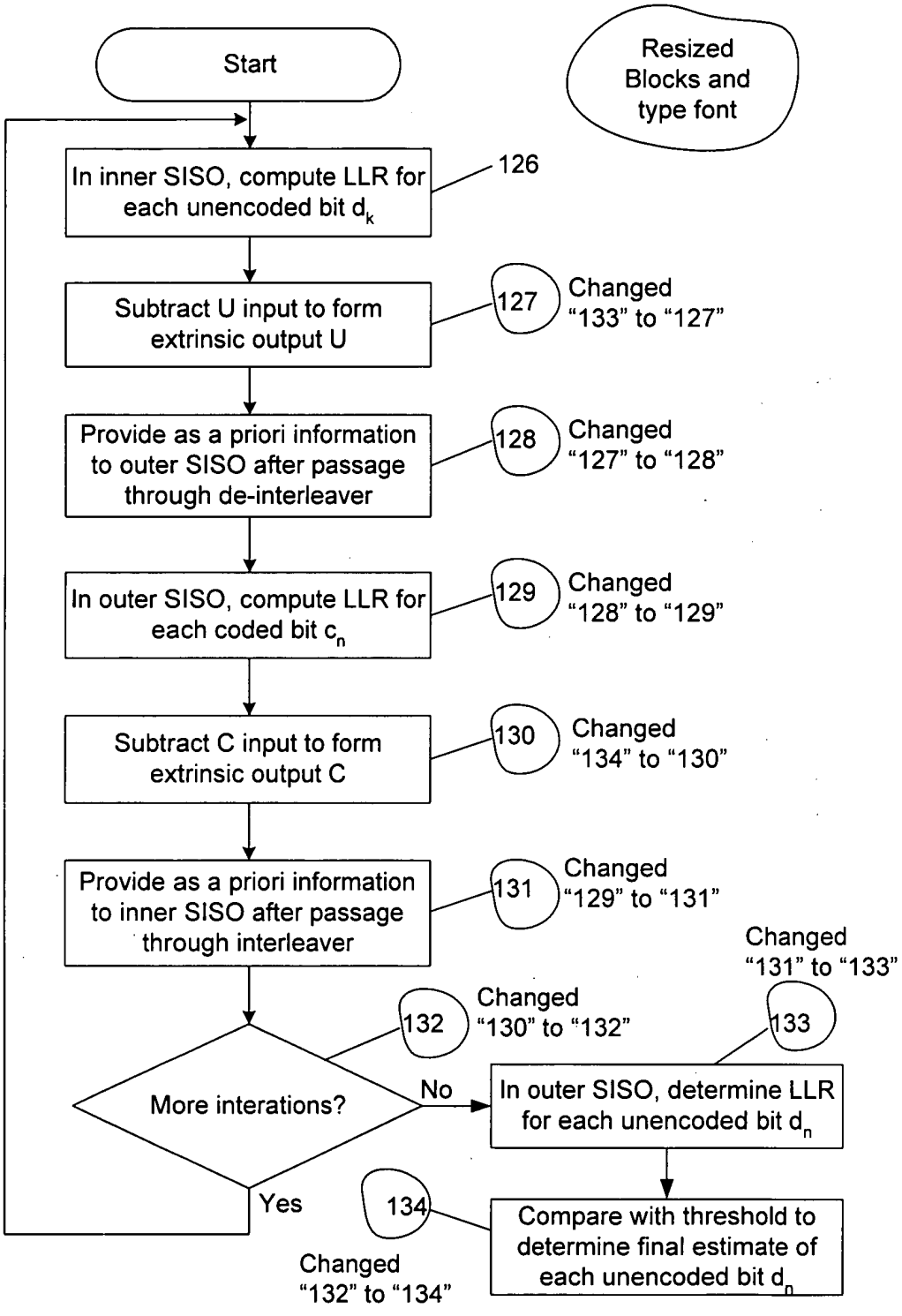

FIGURE 17